Diseases of Bearded Irises

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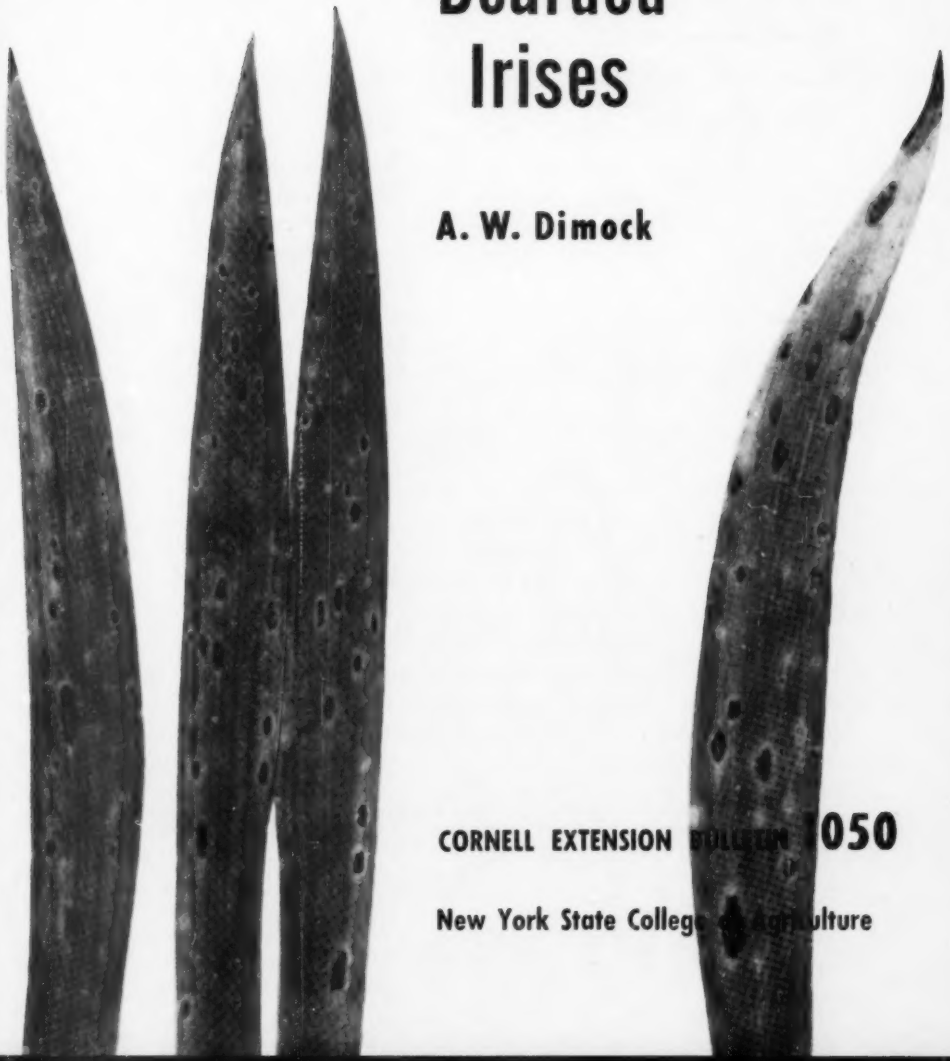

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DISEASES of BEARDED IRISES

A. W. Dimock

Bearded irises possess a range of color and beauty of form rivaled by few other garden plants. Improvements brought about by breeding programs have made them increasingly popular with specialists and with home gardeners. Part of this popularity may be credited to the fact that bearded irises are extremely winter hardy, will grow well on many soil types, and are subject to relatively few serious pests and diseases. One or two diseases are troublesome, however, if no attempt is made to control them; several others are quite serious when they occasionally occur.

Serious development of iris diseases is associated with improper cultural practices. Even though irises are hardy and will survive in a wide variety of conditions, certain general cultural practices are necessary to insure the most vigorous, healthy growth.

Select a sunny, well-drained site for the bearded irises or provide good artificial drainage. Do not plant the rhizomes too deep; the top of the rhizome should not be more than an inch below the soil surface. Employ light fertilization in the spring to promote vigorous growth. Divide the clumps every three or four years, or the fans will become crowded and overgrown with weeds. Keep weeds well controlled at all times—not only for appearance but to permit good air circulation around the iris foliage. These practices, coupled with thorough garden sanitation, will help minimize trouble with diseases and pests.

Of the six or eight iris diseases occurring in the northeastern United States, only one—a fungus leafspot—is encountered to some degree by nearly all iris growers every year. Most iris growers also are troubled by bacterial soft rot at some time. In addition to these common diseases, a fungus stem and rhizome rot, a fungus rhizome rot, a disease called scorch, and a bacterial leaf blight occasionally may be encountered.

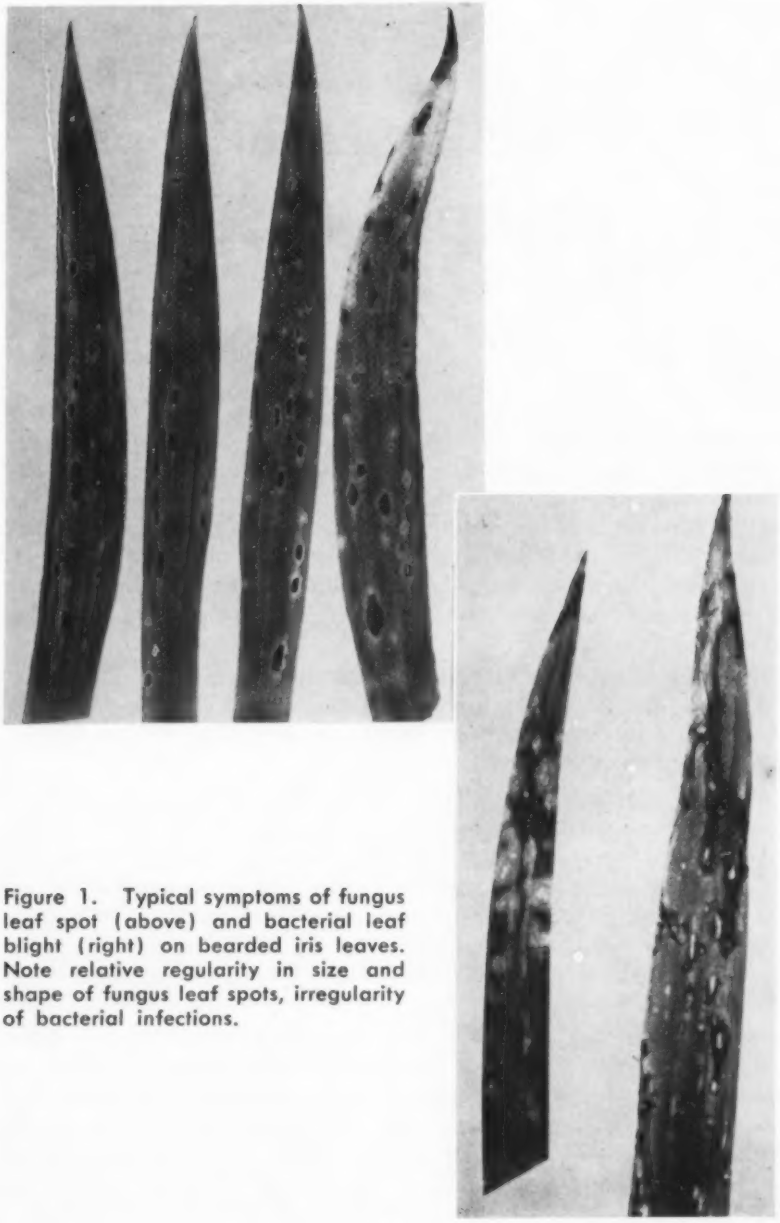

Figure 1. Typical symptoms of fungus leaf spot (above) and bacterial leaf blight (right) on bearded iris leaves. Note relative regularity in size and shape of fungus leaf spots, irregularity of bacterial infections.

LEAF SPOT

Leaf spot does not kill the affected plants, but through repeated serious attacks may reduce growth and vigor. Most important, the plants become unsightly because of premature death of foliage and may become easier prey to other diseases, pests, or adverse conditions.

Identification

Leaf spot is recognized by the more or less circular or oval spots, one-eighth to one-quarter inch in diameter, on the leaves. First evident as yellowish flecks, the spots in time become tan to brown in the center, with a distinct reddish border that distinguishes the spots even after the leaves have died and turned brown (figure 1). With some iris varieties, the leaves die back when only a few spots are present; with other varieties, the leaves may become covered with spots before they die back. In either event, the net result is an unsightly plant.

Causes

The fungus, *Didymellina macrospora,* that causes leaf spot, is highly specific; it attacks iris and perhaps a few iris relatives, but it does not attack other plants. Although it is easily introduced into new areas on infected iris and may persist indefinitely, it can neither build up nor persist on other common garden plants.

Another important characteristic of the fungus is that its spores will germinate and cause infection only if the iris leaves are wet. Splashing raindrops or overhead sprinkling may spread the spores from diseased to healthy plants. High humidity also is essential for the production of spores on diseased tissue. Therefore leaf spot may be very troublesome in areas having a rainy growing season, but its' serious development in arid regions is most unlikely.

The common summer spores of the leaf-fungus (*Heterosporium gracile*) are short-lived and do not carry the fungus over winter. A second spore stage, however, known as the ascospore stage, sometimes develops in overwintering fungus structures and produces spores in spring. More commonly, the fungus survives the winter as vegetative fungal growth either in dead infected leaves or in late-developing spots in living leaves that survive the winter. New spores of the summer type are produced on this vegetative fungal growth in early spring and initiate spots on the newly developing leaves, renewing the cycle for another season.

Control

Control of leaf spot involves two general approaches. One approach is the elimination of the fungal pathogen. If all dead infected leaves are carefully collected, if all infected living leaves are cut off below the lowest infection, and

if all such material is removed and burned, there should be no source of infection to renew the disease cycle in the spring. With sufficient care, such a program will result in a high degree of control. When clumps are divided, particularly good fungus control can be achieved if all old leaf bases are cleanly stripped off and all visibly infected leaves are cut back, and if the divisions are then planted in new or thoroughly cleaned beds.

In older plantings that are not being divided, or in large-scale operations, the effectiveness of the clean-up is reduced by practical limitations. The second approach to control must then be followed. This involves the use of fungicides to protect the foliage against the fungal inoculum that has not been eliminated by sanitation. Fortunately, fungicides are available that will provide excellent protection *if they are properly employed.*

In iris leaf-spot control tests, conducted over a period of several years at Cornell, two types of fungicides have proved consistently safe and effective. The most readily available of these, *zineb,* is marketed under several trade names, including Dithane Z-78, Parzate, Thiodow, and Parberk. A second and closely related material is *maneb.* It is marketed under the trade names Manzate and Dithane M-22. These materials are used as sprays at about 1½ pounds per 100 gallons of water, or about two level tablespoons per gallon of water.

Perhaps more important than the exact concentration of the fungicide is some means of insuring that it covers the waxy, upright iris foliage uniformly, and does not run off in large drops. The addition of a good household detergent will achieve the result. For growers with large plantings, a material known as Triton X-100, will give superior performance. The required concentration of detergent depends on the local water; more is required in hard water than in soft water. The amount may vary from one or two drops to one or two teaspoons per gallon.

Both zineb and maneb are available from farm supply outlets as dusts containing eight to ten percent active ingredient. Often they are constituents of general purpose dusts that contain DDT, malathion, or other insecticides effective for iris borer control. The dusts are best applied when the air is quiet; and they probably stick best if treatments are made early in the morning when the plants are covered with dew. Dusts should be applied with a good duster that will discharge a steady, even flow. Although dusts may be somewhat less effective than sprays, they are easier to apply and require no mixing or tank cleaning.

Proper timing is the key to successful use of dusts or sprays. Start applications *as soon as the first growth is noted in the spring and repeat at least once a week* until major leaf growth is completed. On a weekly schedule, some unnecessary treatments will be made. On a *before rain* schedule some critically important applications may be missed. Making the fungicidal treatment a part of the

weekly routine offers greater assurance of having the fungicide in the right place at the right time. It should be noted that insecticides such as DDT, methoxyclor and malathion for iris-borer control may be added to the leaf-spot spray solutions.

BACTERIAL SOFT ROT

Another common disease of bearded iris is bacterial soft rot. Unlike the fungus leaf spot, this disease, if allowed to go unchecked, may cause death of the affected plants. Wilting and dying of individual fans and soft, mushy, and usually foul-smelling rot of the rhizome characterize this disease (figure 2).

Identification

First evidence of soft rot is a reddish brown die-back of the leaf tips and dulling of the normal green color of the leaves. When pulled, the entire fan comes up readily, and the base is seen to be affected by a soft, foul-smelling rot. Often the affected fans topple over and are found lying flat on the ground.

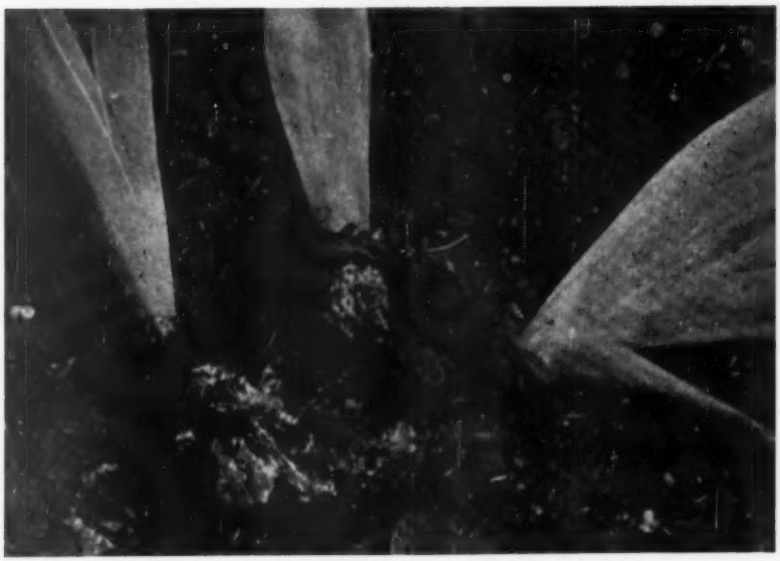

Figure 2. Soft rot of rhizomes of bearded iris. Fans have toppled to the ground following disintegration of rhizome tissue.

When the rhizome at the base of the fan is examined, it is found to be partly rotted also. The rotting may be limited to a single branch of the rhizome or it may involve the entire structure, killing the whole plant.

Causes

Although it is known that soft rot is caused by a bacterium, *Erwinia carotovora,* there is some difference of opinion about the conditions that initiate the rot and permit it to develop. Some growers believe the iris borer paves the way for bacteria to gain entrance; others point out that borer activity often is serious when soft rot is not present, and that soft rot can be present when there is no evidence of borer activity. Similarly, soft rot bacteria may enter winter-injured tissue and cause extensive rotting of the rhizomes, but winter-injury is not always followed by soft rot. Some growers claim that soft rot is a consequence of deep planting; others point both to cases of deep planting without soft rot and to cases of soft rot in shallow-planted rhizomes. And there are those who accuse organic manures, chemical fertilizers, excessive moisture, and many other factors. Actually, it is probable that no single factor is responsible, but that two or more factors work together.

What are some of the known facts? First, iris tissues are more susceptible to soft rot bacteria than are tissues of most garden plants. Second, there is convincing evidence that a wound (or winter injury) is necessary for the bacteria to invade the plant tissue. Third, although soft rot may progress under somewhat dry conditions, the disease normally is initiated under unusually wet conditions. Fourth, organic manures about the base of the plant favor rot development, by introducing the soft rot bacteria in the first place, or possibly by increasing plant susceptibility.

Soft rot, then, may develop if the bacteria are present, if wounds are made by borer activity, cultivation injury, or other means, and if, at the same time, the moisture conditions are kept at a high level. Borers are without doubt a very common and important factor in soft rot development, because they not only can and do make wounds through which soft rot bacteria enter, but they also maintain the wounds by their continued activity. If the bacteria are not introduced in some way, or if conditions are unusually dry, soft rot may not become established and the borer tunnels may remain free of soft rot. It is apparent that if a coincidence of three factors—the right bacteria, a fresh wound, and high moisture—were not required, soft rot would be infinitely more common and damaging than it is.

Control

The facts about the development of soft rot provide a basis for effective control procedures. The following general rules are suggested:

Avoid deep planting; it may not cause soft rot but will favor it once it starts.

Control iris borer by removing and burning all old leaves in the fall and by using DDT or other effective insecticide in the spray or dust program from the time spring growth starts until the period for leaf entry is past. Consult your experiment station entomologist about spray or dust schedules.

Employ practices that will minimize accumulation of moisture at the base of the plants. For example, plant in full sun, and do not put a deep mulch on the plants.

If soft rot is observed in an iris clump in spite of these precautions, the affected fans should be removed immediately and the rotted portion cut out or scooped out with a sharp spoon. This may be all that is needed if the rhizome is then exposed to full sun to allow the affected area to dry. Some growers feel that drenching the areas with corrosive sublimate, cresol solution or antibiotics (Streptomycin, Agrimycin) affords further assurance of recovery. Little experimental evidence is available, but such treatments seem to do no harm and may be of real value.

SCLEROTIUM ROT

Identification

Less frequently observed, but potentially very destructive is the fungus rot known as Sclerotium rot. With this disease, tips of the leaves may turn brown and die much as with scorch or soft rot, and the affected fans may topple over as with the latter disease. Although the leaf bases are found to be rotted, the rot is not soft and wet, but is brown and somewhat dry. On the surface of the soil or on the plant tissue itself, whitish to tan, fan-like strands of fungus growth may be found. Usually, numerous spherical, tan to brown fungus structures called sclerotia, about the size and appearance of radish or mustard seeds, are present on the soil at the base of the plant or on the rotted tissue.

Causes

The causual fungus, *Sclerotium rolfsii,* commonly called the mustard seed fungus, is widely distributed throughout the United States but is most common in southern latitudes. Development of the fungus and of the disease is favored by high temperature and high humidity, especially when there is moisture around the base or crown of the plant.

Control

Partial prevention of sclerotium rot may be achieved by insuring that water drains rapidly away from the plants. Plants might be placed on slight ridges or mounds.

If the disease appears, infected plant parts should be cut away and the soil drenched with Terraclor, using one ounce to six gallons of water (about two level teaspoons per gallon). Because Terraclor is persistant in the soil, it may be useful as a protective treatment for healthy plants if sclerotium rot is a common problem. Corrosive sublimate is no longer recommended as a drench for control of sclerotium rot. Terraclor is very much more effective.

BOTRYTIS RHIZOME ROT

Botrytis rhizome rot is not often encountered, but it is a serious disease because it usually kills affected plants.

Identification

Botrytis rot is recognized in early spring by failure of the plants to start growth or by the development of only a few weak shoots. Infected plants usually can be pulled up easily because the roots are badly rotted. The rhizome also may be partly or completely rotted, with a grey-brown, odorless, dry rot (not a wet, soft rot), and with a distinct dark band between healthy and diseased tissue. The rotted areas are somewhat shrivelled and wrinkled, and the surface is covered with dark-grey to purplish, fuzzy growth (figure 3). Mixed in with this growth, and also in the soil, are large, hard, shiny-black, irregular, wrinkled or convoluted sclerotia of the fungus.

Causes

The fungus which is evident on the surface of the affected rhizome is the cause of the rot. Named *Sclerotinia convoluta* (its functional spore stage is a *Botrytis*), it is a cool weather fungus, most active between 54°F. and 65°F., and attacks only in fall, winter or spring. Above 68°F., activity is greatly restricted. Infection requires a wound of some sort, and evidence suggests that winter injury may be conducive to Botrytis attack. It is even probable that in many cases winter injury *is* Botrytis rhizome rot. The disease may be carried on divisions that are essentially normal in appearance, and the fungus, thus introduced, may persist in the soil.

Control

Treatment of the rhizomes with a five to 10 minute dip in calomel suspension (one ounce calomel to one gallon water) at the time of division will eliminate surface contamination and give excellent control *if* the plants are reset in clean soil. Certain other mercurials have proved effective. The suggested program is: treat divisions with calomel prior to planting; do not plant on soil where Botrytis rhizome rot has been a problem unless the soil is first sterilized; and provide winter protection with a light mulch.

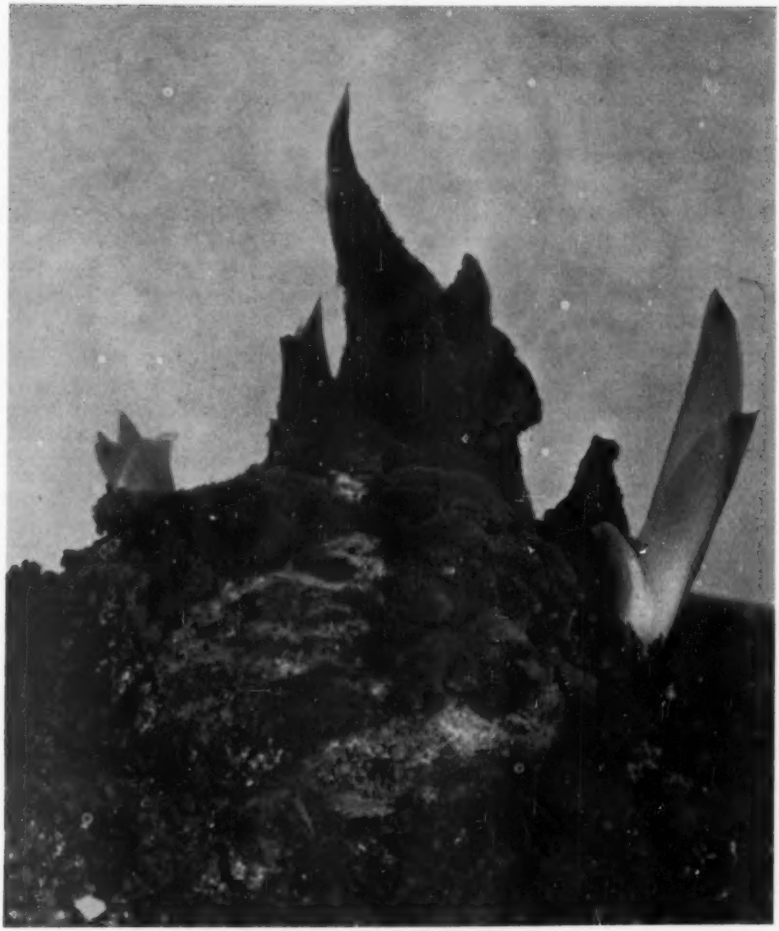

Figure 3. Rhizome and shoot of bearded iris affected by Botrytis rhizome rot. Note dark, fuzzy spores of the fungus covering sclerotia and affected tissues. Roots are completely rotted.

SCORCH

Identification

The disease known as scorch has become a very serious problem in many parts of the country within the last ten to fifteen years. The symptoms characterizing scorch start with a dying back of the plants, beginning at the leaf tips. The affected leaf tissue turns a rather distinctive brown or reddish brown. Usually the center leaves of the fan are affected first but the disease progresses rapidly and all of the leaves soon are killed back to the rhizome although the rhizome remains firm and the fans cannot be pulled away easily as when soft rot is present (figure 4). Concurrently, the fleshy cortial tissues of the fibrous roots start to rot, first at some distance from the rhizome, but later throughout their length. In advanced cases nothing may remain but the tube-like outer tissues encasing the rot-resistant fibrous bundle of conducting tissues. As with the leaves, the dieback of the roots stops at the rhizome, or at most, penetrates it very slightly.

Causes

At present the cause of scorch is not known. Many fungi, including Fusarium, Pythium, and Rhizoctonia have been isolated from diseased roots, but all attempts to produce the disease experimentally with these organisms have been unsuccessful.

Control

At the present time, no certain method of controlling scorch is known. It has been reported that when the roots have been stripped from affected rhizomes and the rhizomes thoroughly dried before replanting, healthy new growth has developed. Whether such rhizomes actually are cured is unknown. Claims have been made for certain chemical treatments, but at present there is no valid evidence that such treatments definitely will eliminate or prevent scorch.

BACTERIAL LEAF BLIGHT

Bacterial leaf blight has been observed sporadically for over three decades. In some seasons it causes serious damage, and is then almost wholly absent for a number of years.

Identification

Bacterial leaf blight resembles the fungus leaf spot; in fact, the differences are not too easily described. The spots caused by the bacteria are at first small pale areas over the leaf surface, particularly abundant along the margins. They

Figure 4. Scorch symptoms on bearded iris. Note withering and dying-back of central leaves. In a short time all leaves of affected plants die back to the rhizome.

enlarge into elongated irregular areas, most readily seen when the leaves are held to the light. The central areas become water-soaked and eventually collapse and turn brown, but do not usually develop a darker border. In wet weather the spots may exude a sticky, bacterium-laden mass that dries into a thin glue-like film. Infection may develop seriously with continued rains, and entire leaves may be killed. On the other hand, further progress of the disease may be abruptly arrested by dry weather.

The fungus leaf spots, although varying in appearance on different iris varieties, usually possess a more or less regular, oval shape and do not become irregularly enlarged and elongated. The center usually becomes smoky grey or tan, surrounded by a dark brown zone that in turn may be encircled by a yellowish border. The spots are randomly distributed across the leaves rather than being more abundant along the leaf edges. The characteristic features of the bacterial and fungal leafspots are well illustrated in figure 1.

Cause

The bacterium (*Xanthomonas tardicrescens*) that causes leaf blight is different from the soft rot bacterium; in fact, it will not cause a disease of the rhizomes. It is readily spread by splashed water and may be picked up and carried to healthy plants on knives or shears used to trim the leaves.

Control

The zineb and maneb spray materials that have proved successful for controlling fungus leaf spot unfortunately will not control bacterial leaf blight, and the value of antibiotic sprays has not been determined. At present growers can rely only on sanitation and on the avoidance of overhead sprinkling when bacterial blight is present. Infected leaves should, so far as is practical, be removed, but the hazard of spreading bacteria on kinves or shears should be kept in mind and any such tools used in trimming the plants should be dipped in lysol solution between cuts. Removal of all old leaves in the fall should help minimize the overwintering of blight bacteria as well as the leafspot fungi, borers, and other pests.

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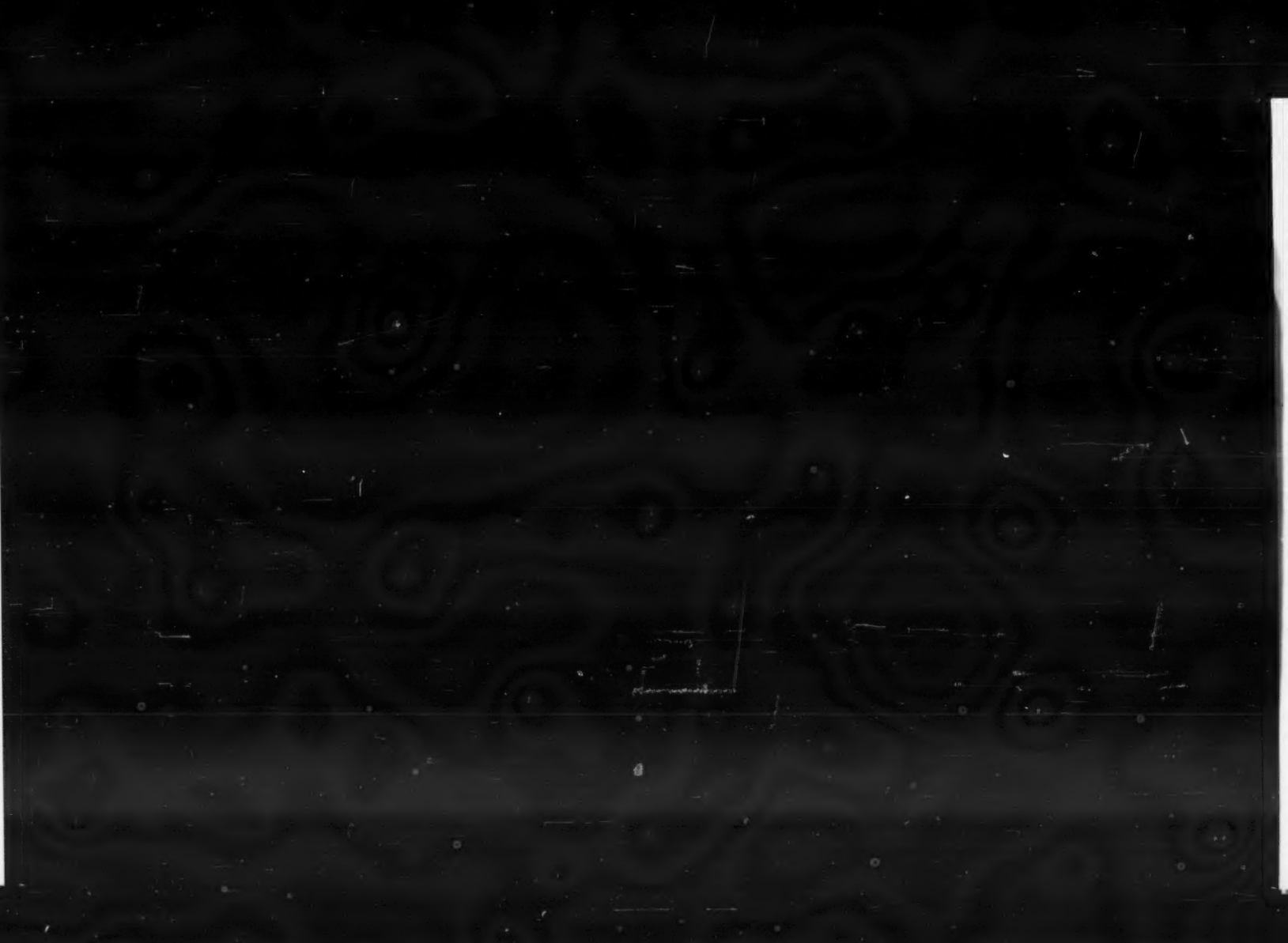
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